Air Quality Event Summary
July 22 and July 23, 2004

New Hampshire experienced its first two days of unhealthy air quality in 2004 on Thursday, July 22 and Friday, July 23 as temperatures reached the high 80s across the state and a persistent south to south-westerly wind resulted in the highest ozone and particle pollution levels of the year so far. Skies were mostly clear throughout the period and even though temperatures were not all that high, ozone was produced at significant enough quantities and transported from the northeastern metropolitan areas into New England. Typically New Hampshire receives 10 days per year of unhealthy ozone levels. This summer has been unusually cool so we have not seen elevated ozone levels this year until this time.

A visible haze on Friday, July 23 suggested elevated particle pollution levels and this was clearly shown by the continuous $PM_{2.5}$ monitors across the state. The very high particle pollution levels were unusual for New Hampshire and point to an additional source of particles besides the upwind urban areas. For particle pollution (specifically $PM_{2.5}$), it is uncommon to monitor levels in the unhealthy for sensitive range (above 40.5 ug/m^3) but these $PM_{2.5}$ levels were measured on Friday, July 23 at numerous sites. The federal $PM_{2.5}$ standard is 65.5 ug/m^3.

The tables below show the highest ozone and $PM_{2.5}$ concentrations for the two-day event. Levels of both pollutants decreased significantly on Saturday, July 24 with the passage of a cold front.

Ozone

max 1-hour average

monitor	max ppb
Manchester	104
Keene	95
Odiorne	81
Claremont	105
Nashua	110
Concord	104
Portsmouth	82
Miller	88
Laconia	93
Mt Washington	94
Haverhill	89
Camp Dodge	102
Pittsburg	79

1-hour exceedance is > 124 ppb

max 8-hour average

monitor	max ppb
Manchester	94
Keene	81
Odiorne	71
Claremont	96
Nashua	97
Concord	92
Portsmouth	76
Miller	84
Laconia	83
Mt. Washington	89
Haverhill	74
Camp Dodge	86
Pittsburg	67

8-hour exceedance is > 84 ppb

Particle Pollution ($PM_{2.5}$)

max 1-hour average

monitor	max ug/3
Manchester	62
Portsmouth	56
Haverhill	61
Miller	
Camp Dodge	48

no 1-hour standard

max 24-hour average

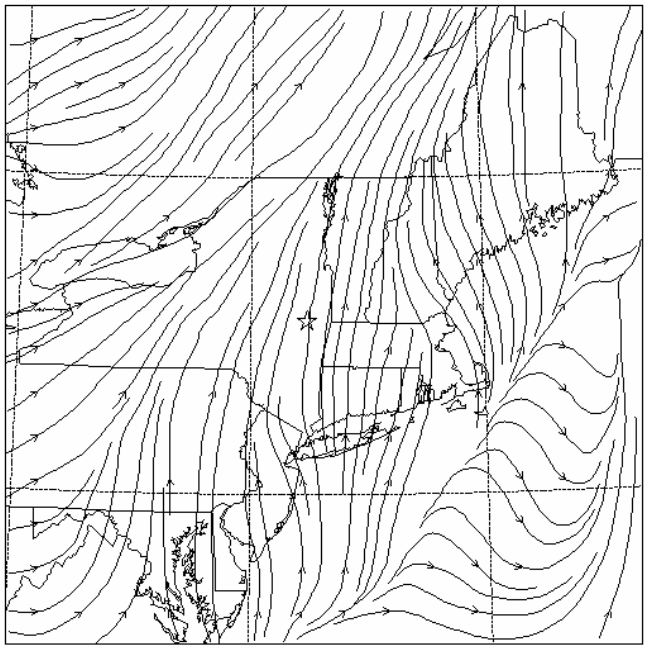
monitor	max ug/3
Manchester	48
Portsmouth	44
Haverhill	43
Miller	
Camp Dodge	31

24-hour exceedance is > 65 ug/m3

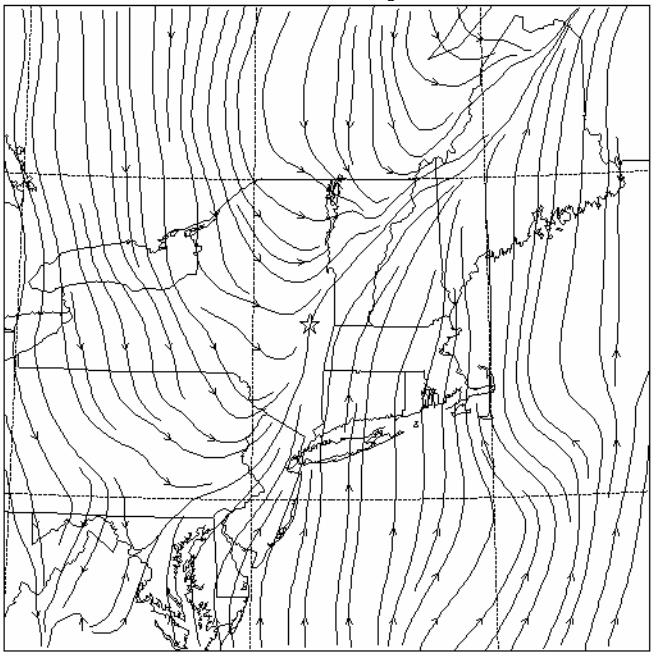
The surface wind flow at 5 PM on July 22 and 23 is shown on the next page, along with the regional distribution of maximum 8-hour average ozone and 24-hour particle pollution. The orange color represents unhealthy air quality (above the 8-hour ozone standard and 24-hour $PM_{2.5}$ unhealthy level of 40.5 ug/m^3), yellow is moderate and green is good. The streamline analysis shows most of New England to be in southerly flow on Thursday and a more south-southwesterly flow on Friday. Looking at the streamlines, long-range transport seems to be limited, with the Midwest not contributing much in terms of pollutants and no distinct air flow directly up the Northeastern Corridor, though that does establish itself more on Friday ahead of the advancing cold front. The color ozone graphic suggests emissions from the New York City metro area are being carried into coastal NH and ME along the streamlines, while the Boston plume is probably adding to the high levels up to downeast ME. An onshore flow south of NYC kept ozone levels in that area from reaching the unhealthy category.

Western NY was also in a southwest flow, which brought in high ozone from the Ohio Valley. On the day before (June 20), unhealthy ozone was monitored over a large area in Ohio and Indiana and both the surface and upper-air wind flow likely transported some of that ozone into NY state, and possibly all the way up to northern ME. Westerly winds at higher levels (i.e., 5000 ft) may also have transported ozone into NH from the Ohio Valley.

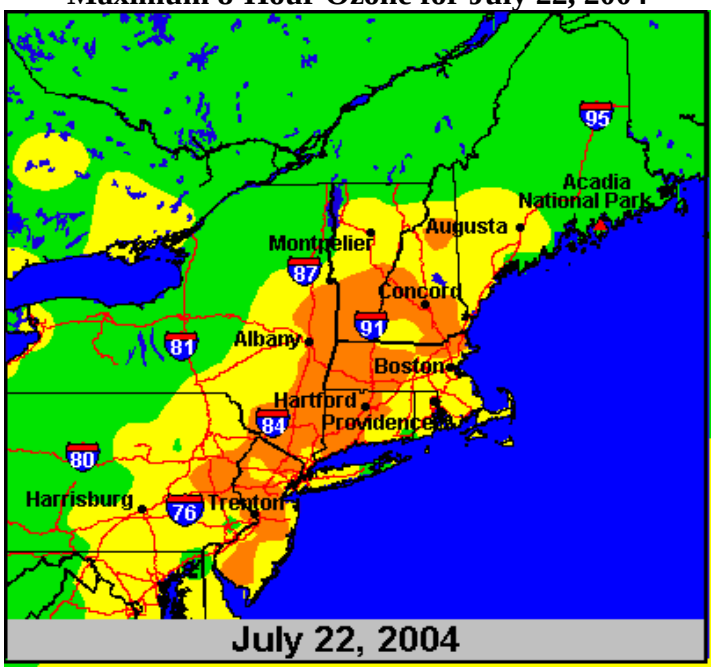
Streamlines for July 22, 2004



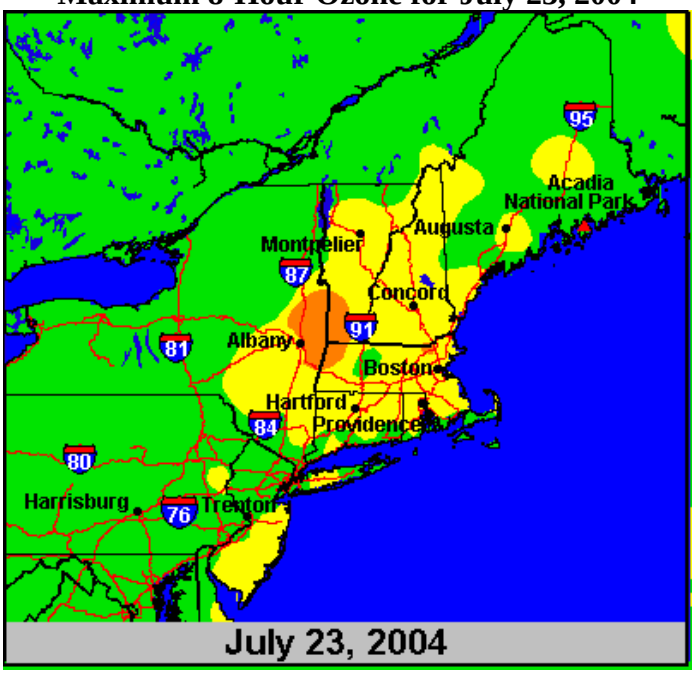
Streamlines for July 23, 2004



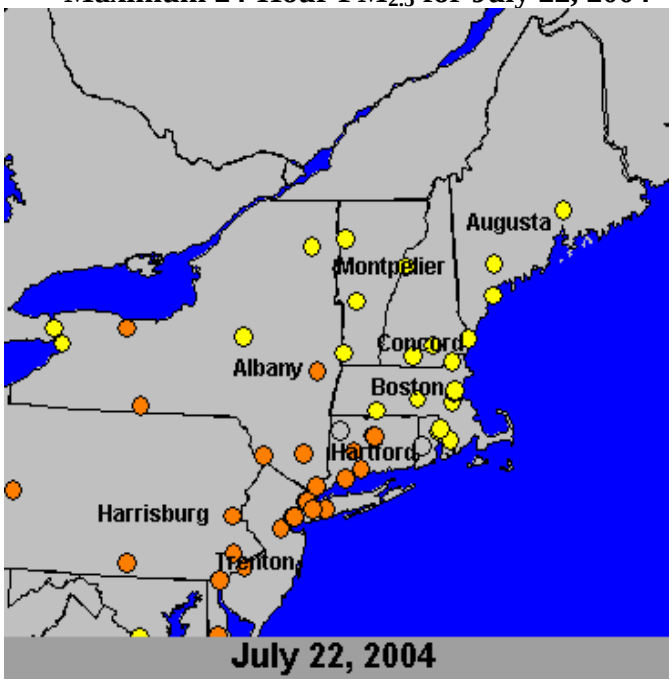
Maximum 8-Hour Ozone for July 22, 2004



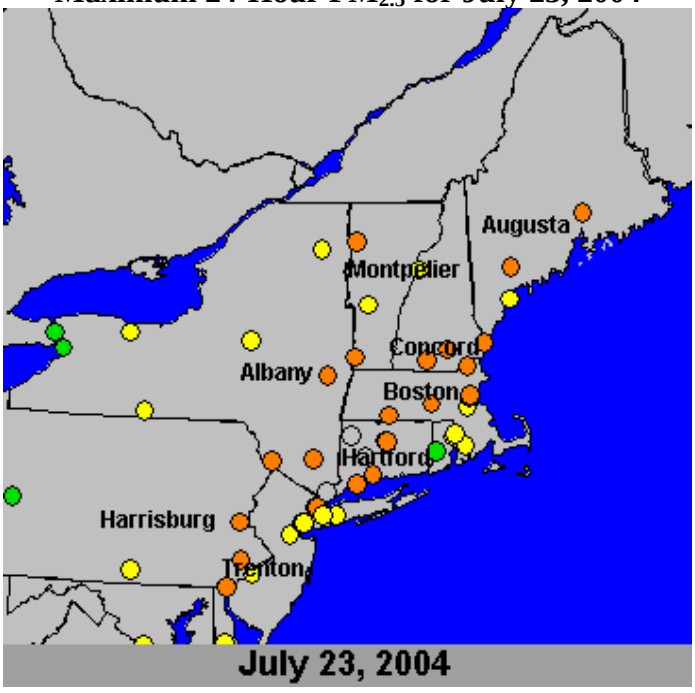
Maximum 8-Hour Ozone for July 23, 2004



Maximum 24-Hour $PM_{2.5}$ for July 22, 2004



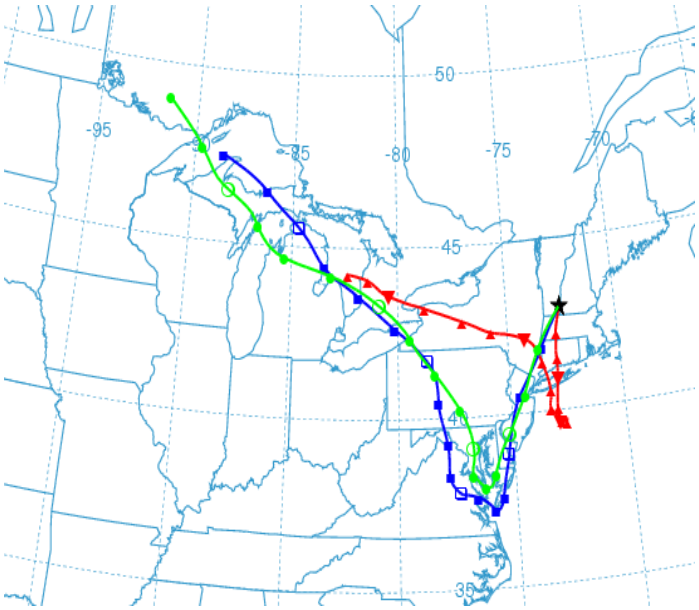
Maximum 24-Hour $PM_{2.5}$ for July 23, 2004



Though the northeast streamline analysis helps to partially explain the occurrence of high ozone values in the northeast, it does not fully explain the source of the fine particulate matter. To understand the mechanism which resulted in high $PM_{2.5}$ concentrations, a broader view is needed. The following images show the air parcel trajectories over several days (at different levels in the atmosphere), along with a satellite-derived image of smoke from fires burning in Alaska and western Canada, as well as the southeastern United States. Dry weather in the west resulted in several large

forest fires which burned over several days. The smoke from these fires followed the air trajectories, which eventually transported the particulate matter up to New England. $PM_{2.5}$ levels fell soon after this time as the wind direction shifted and the forest fires began to decrease.

Long-Range Trajectories ending July 23, 2004



Smoke Plume Image on July 23, 2004